Science and the Shark

Surprising Facts About the Sea Tigers Now Infesting Our North Atlantic Coast---Their Monstrous Ancestors, and How We Got Our Ears from Them

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THE shark is the sea mystery of science. The extraordinary invasion of North Atlantic waters by thousands of them is only the latest mystery that this interesting fish—to which, by the way, we owe our own ears and movable jaws—has provided.

For instance, strange as it may seem, scientists have been at odds as to whether a shark is really a "maneater"—that is, whether sharks actually have a taste for human flesh and can and do snap off arms and legs and in some cases sever bodies because they like the flavor of humanity. The opposing camp has held that the shark only does this when it is extraordinarily hungry or frightened. The affirmative has held that there exists the appetite for human flesh among certain sharks, and that this appetite is steadily increasing. They have the weight of evidence on their side.

Sharks are of two kinds, broadly speaking. The oviparous or egg-laying species, and the viviparous species which bring forth their young alive. Science has declared that the egg-laying sharks are the only ones that are maneaters. The viviparous, although the largest and including the basking shark and whale shark which attain a size of thirty-two feet, have been classed as harmless. This is only because no instance has ever been observed of this species attacking man for his flesh. Nevertheless it is not well to take a chance with the big ones.

The shark is the brainiest of fish, with the exception of its close cousin the manta, also called the flying ray and devil fish. The shark by its brain ranks among the fishes as man does among mammals. The ray would be classed on earth as a superman endowed with flight and devilish ingenuity. The ray has gained this greater brain power by the fact that it can skim along the surface of the water like a hydroplane. If we could suddenly breed a man with a pair of wings and the additional motor and brain centres necessary to manipulate the wings we would have an exact parallel between the shark and its cousin.

Despite the fact that the shark is the brainiest fish it is also the most bone-headed. This is because its gigantic ancestors of the Eocene period, some millions of years ago, were forced to crack open armor-plated fishes for their food.

These Eocene sharks which began life about 250,000,000 years ago were monsters indeed. Fossil jaws at the American Museum of Natural History, New York, show a stretch of from twelve to eighteen feet. In other words, such a shark could easily bite in two a motorboat. These sharks grew 120 feet long.

The shark is the only fish with what may be called true ears. Indeed we owe our ears and our movable jaws to this ferocious sea dweller. In the ascent of animals it is notable that some special organ is developed as each stage is passed. As the beginning of the brain as real brain goes back to the worm Amphioxus, in the common ancestors of shark and man two very important developments of structure first appear. These are the hinged jaws, movable at the will of the animal and in addition, as if preparing the way for the co-operation of the jaws to utter sounds, the shark was the first animal to have ears.

To put it in a few words, in the process of evolution, had it not been for the stage of the common ancestor of shark and man, man would have been both deaf and dumb, for speech is absolutely dependant upon a moveable jaw, or articulation would be impossible. And besides, unless we hear, and we cannot hear without ears, we can never learn to talk.

Sharks have a strong sense of smell, and their vision is limited to one hundred feet under water and possibly to less than fifty feet when their head emerges from their native element.

It is nearly impossible to compare the jaw of a shark with that of a human being or other mammal. A man chews, rather than bites his meats, because his teeth are built that way. The mammal teeth are largely for mastication. While, of course, one man can give another a nasty bite, he cannot crash his teeth through bones or even muscle. The jaws of a shark the same size as the man will have, it has been conservatively estimated 162 times more foot pounds of energy to snap with than the man to bite with.

The larger the shark, the more terrible will be the foot-pound energy of his jaws. Connected with those jaws are every muscle of his body and his long, powerful tail. In his tremendous leap and snap, every mite of power of his entire skeleton is exerted. When the jaws snap, the big saw-shaped teeth cut clean through flesh, muscle and bone.

Man has so many teeth that their functions are described as strictly limited to mastication, giving the face a proper appearance, making a pleasing looking skull, and particularly for sexual attractiveness. On the contrary, the sharks and rays have teeth embedded solely in the tough, fibrous membrane which covers them. They have no cartilage. The jaws have a sliding, rotary motion, new teeth constantly replacing those lost or worn out by snapping prey. Man works his jaws in all directions to masticate a tough steak, but the shark need only open and shut his jaws and swallow their clutch with a gulp.

The ancestors of sharks were forming these terrible skulls and teeth, as I have said, 250,000,000 years ago. They got on the job in water among the very first—perhaps the first—vertebrates. These ancestors had to feed on armor plated prey, and had to have jaws and teeth that could bite clean through the heaviest carapace or armor.

Some of the teeth found petrified were shaped like broad axes, pure and simple, as in Dinichthys, the most terrible water inhabitant of the early Devonian era. In later times, successor sharks evolved whose petrified skeletons measure up to 130 feet in length. The shark may have dwindled considerably in size in modern times, to thirty feet in length, but even if not so large and powerful, he has greater prowess.

He will never become extinct because of starvation, as his ancestors probably did.

The ancestral size was too great for the visible food supply. The last of the ancestors probably ate each other, leaving only an individual here and there to petrify. There are remains of one specimen of Carcharodon, the greatest fossil shark, principally huge, saw-toothed shaped teeth, and these are on exhibit in the American Museum of Natural History. Carcharodon cannot be restored until more of this institution is built. His body, made of papier mache or plaster, would fill a space 120 feet long and 45 feet in circumference. His back fin will tower 18 feet high and his caudal fin, which you may call forked tail, will be 18 feet across. His teeth were five inches wide at the base and six inches high. When the teeth were laid out on the table, they covered forty square feet. It would have required 100 horses to haul the carcass from the beach.

Nature had to modify the size of modern sharks to the size of their modern victims. Modification of size has been consummated in every species of animal that could be bettered by it. The exceptions are solely among mammals and snakes.

A shark's size seems to depend solely upon how much food it gets and how old it is. You cannot tell how many years it has lived simply by its size. But the larger it is, the older it is seems to be a safe assumption.

The porpoise is the one animal for which the shark has a deadly fear.

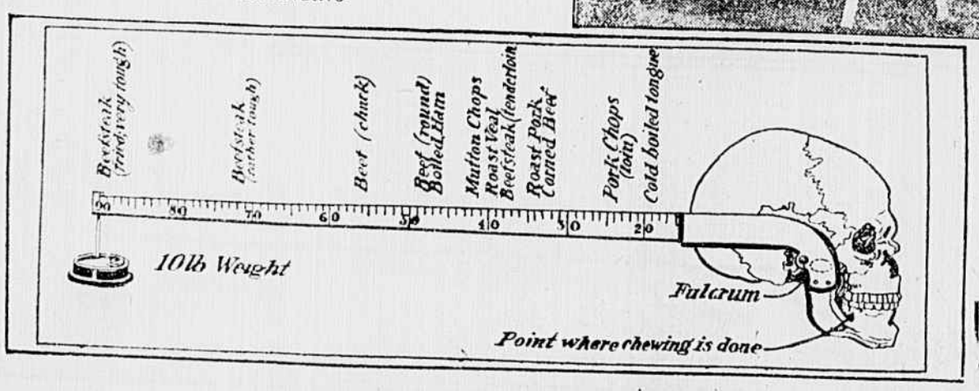
The shark is the most tenacious of life of all animals. The great whale shark was brought ashore off Knight's Key, near Miami. The killing was bungled, the shark apparently dying, after five days endurance, only because of stranding. He was harpooned and shot repeatedly without paying the slightest attention, as if unknowing of his wounds. He swam around in circles, normally, impervious to ropes and all resistence until stranded. A hole cut in his brain, through five inches of gristle, did not kill him. That none of his captors knew of the knife thrust in the throat act, as practiced in the North, is astonishing.

The viviparous shark, though not a mammal, suckles its young. The scientist Gill got the evidence that one of the many species of rays, the sting ray, suckled its young before birth from spiracles and the spiral valve of the intestine, dripping with liquid akin to milk. The unborn infant received the liquid, not through its mouth, but through channels homologous with the ear drum or air-breathing vertibrates. Only after the progeny is fully suckled and ready to swim, is it born. On the basis of the sting-ray, Gill assumed, and so must we, that all species of these viviparous monsters are so grown within the mother and fed before birth.

As to future infestations of our Eastern coast—it matters little whether sharks will breed in these waters or elsewhere. Their progeny will acquire the renewed taste for human flesh which doubtless has followed, for a time, every sea war in history. Should a long peace prevail, the taste may gradually decline to normal.

A Shark Caught at San Pedro, California. It Weighed Twenty Tons, and Two Children Could Sit in Its Mouth.

The Shark of the Eocene Period, Which Grew to 100 Feet in Length, Had a Mouth from Ten to Eighteen Feet Wide When Open, and Could Easily Have Snapped in Two a Laden Motorboat. The Photographic Diagram Is Accurately Reconstructed from Skeletal Fragments of the Fossil Monsters at the American Museum of Natural History, New York.



On the Left is a Diagram Illustrating the Power the Human Jaw Must Exert to Bite the Various Articles of Food Lettered on the Scale. A Shark the Same Size as a Man Has 162 Times the Jaw Force. His Whole Body Is Used in the Snap, and Additional Force Is Given by the Powerful Tail. He Is in Fact a Biting Machine, the Whole Body Having Adapted Itself from Tail to Jaws to This Mission Through Millions of Years.